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ABSTRACT

This report describes the pilot program for SPINES, a computerized system for collecting, selecting, analysing, and disseminating documents and factual data that have a direct bearing on policy-making, arrangement, transfer, and assessment in science and technology. This data is needed in developing policies for the advancement of science and technology, and their application in developing countries. Included in the description are (1) the objectives and principles of the SPINES system; (2) an outline of project development--feasibility study, thesaurus, consultations and meetings, and workshops; (3) the pilot program--objectives, activities, and cooperation; and (4) instructions on how to take part in the pilot program. Fields covered by the system, a summary table of planned activities, and SPINES documents and publications are listed in the appendices. (KP)

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SPINES PILOT PROGRAMME FOR THE INTERNATIONAL EXCHANGE OF INFORMATION ON THE APPLICATION OF SCIENCE AND TECHNOLOGY TO DEVELOPMENT

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UNITED NATIONS EDUCATIONAL,
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SPINES PILOT PROGRAMME FOR THE INTERNATIONAL EXCHANGE OF INFORMATION ON THE APPLICATION OF SCIENCE AND TECHNOLOGY TO DEVELOPMENT

SUMMARY

It is nowadays acknowledged that one of the greatest hindrances to development is the lack of selected data to provide a basis for rational decisions concerning policies aimed at the overall advancement of science and technology and their systematic application to the development of countries. In order to meet this pressing need, Unesco is attempting to set up a computerized system for the exchange of information among its Member States, a system for collecting, selecting, analysing and disseminating documents and factual data that have a direct bearing on policy-making, management, transfer and assessment in the field of science and technology: the SPINES system.

Following the preparatory phase of the project (1970-1976) which consisted chiefly in the publication of the SPINES Feasibility Study and the SPINES Thesaurus and in the organization of several technical consultations and surveys, the General Conference of Unesco at its nineteenth session (November 1976) authorized the launching of a SPINES Pilot Programme (1977-1982) with the voluntary participation of Member States and interested national and international organizations. The activities embarked upon under the SPINES Pilot Programme will make it possible to seek user-responsive and cost-effective approaches to SPINES, to gain operational experience with a view to improving the design of the proposed system, and to assess as accurately as possible its effectiveness and its costs both for Unesco and for participating Member States.

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1. OBJECTIVES AND PRINCIPLES OF THE SPINES SYSTEM

1.1 Present world situation

The last two decades have witnessed a remarkable increase in the importance attached to science and technology policies both as part of the management at the government and other levels and as a field of study. The need for an efficient and selective access to world literature in the field of science and technology policies is more acute in developing countries which have only recently established governmental science and technology policy structures and in university departments or units for science policy studies; such a need is also increasingly felt by the large industrialized States, whether by governments, parliaments, large science-based enterprises, academic institutions or national research organizations; and it has also been officially recognized by a number of international organizations, both within and outside the United Nations family of organizations.

Several international bodies including the United Nations General Assembly and the Economic and Social Council, have recently drawn the world's attention to the present inadequacies of international information exchange on the management, transfer and assessment of science and technology and their application to development. It should be noted that an information system covering on one side all the fields of science and technology for policy-making, management and development, dealing on the other side with political, social, economic and cultural aspects of science and technology policy does not exist anywhere in the world, despite the fact that several attempts or proposals have been made at the national and international levels in this connection (e.g. in the United States of America, Canada, the Parliamentary Assembly of NATO, the European communities). Moreover, the few isolated attempts to create information systems in this field at the national level, have for the most part failed because the "critical size", i.e. the minimum number of annual input references needed to sustain a computerized information system, had not been attained. There exists, however, in a few countries, classical documentation services providing bibliography lists or newsletters (examples are the monthly bibliography issued by the Union of Soviet Socialist Republics Academy of Sciences, and the MIT Bulletin), but they are generally limited in coverage and scope and do not respond to the urgent needs of developing countries. At the international level, existing channels and services do not allow for compatible exchange of selected information on ongoing R&D projects and on development projects calling for the application of science and technology.

These inadequacies at both the national and the international levels arise chiefly from the difficulties inherent in mastering this type of information. The main difficulties are as follows:

(i) difficulties of acquisition:

- many countries have no national information infrastructure (documentation services or data bank) in this field;
- this information is spread over numerous disciplines and is disseminated in a wide range of documents, which are in many cases not available through the normal channels of distribution and are usually difficult to locate;
- rather sharp barriers exist in this field between the specialists of different countries or regions;

(ii) difficulties of selection and use:

- users are inundated with material which is irrelevant or of little value, owing to the growing output of literature in this field, and which is often unusable because it rapidly becomes obsolete;
- the field is steadily widening and the character of the information is often highly technical; hence it is difficult to locate the expert knowledge and advice necessary for the interpretation and use of valid information.

In short, in order to remedy the present inadequacy of the exchange of information on the application of science and technology to development, Unesco is attempting to set up a selective and economical computerized system for information exchange among its Member States, which will collect, select, analyse, store, retrieve and disseminate documents and factual data on policies aimed at the overall advancement of science and technology and at their practical implementation with a view to the economic and social progress of countries.

1.2 Basic principles of the SPINES system

In the light of the recent resolutions of various United Nations bodies on a new international economic order, on the international strategy for the Second Development Decade and on the transfer of scientific and technological information(1), the SPINES system is based on the following principles:

(i) Member States and international organizations should be assisted in the sharing of the literature and basic data which they produce on questions relating to science and technology policy-making, including, in particular, the management, transfer and assessment of science and technology, and their application to development;

(ii) developing countries must enjoy a greater flow of information permitting the selection of scientific advances and new technologies suited to their specific needs, and the appraisal of possibilities of adapting them to local conditions;

(iii) a science and technology policies information exchange system should be addressed to the above needs. It should be based on voluntary participation of Member States and international or national organizations as regards information input; the output of the system should be made accessible to all Member States and to the participating organizations. It should be conceived as both a bibliographic and a numerical data system;

(iv) this system should include the large amount of documentation produced by the United Nations, its affiliated bodies and Specialized Agencies, and by other international organizations in the field of science and technology policies, concerning all aspects of the application of science and technology to development.

1.3 Subject scope of the SPINES system (4)(2)

SPINES will be a world-wide system, and accordingly the subject scope will take into account the different theoretical and practical approaches to science and technology policy at present adopted by the various Member States of Unesco. Information of interest to the SPINES system includes both documents (books, articles in periodicals, legal documents, reports, theses, machine-readable media, audio-visual materials, etc.) and factual data (nominal, numerical and perceptual data, statistics, indicators, etc.) in the following four major fields:

(i) foundations of science and technology (development of theories, standards and methods with a view to science and technology policy making);

(ii) science and technology resources (human, financial and institutional resources, information and facilities for R&D activities and for the activities of scientific and technological services);

(iii) practice of science and technology policy-making (science and technology planning, programming, budgeting and forecasting; assessment and transfer of technologies; R&D management);

(iv) content of plans, programmes and projects related to scientific and technological activities (content of R&D plans and programmes in the field of the natural, human and social sciences; content of R&D projects and activities of science and technology services now in progress).

The content of each of these fields is given in greater detail in Annex 1 to this document.

Some specialists consider that the coverage of the SPINES system, which embraces the technical, ethical, political, economic, social and cultural aspects of science and technology, is too broad to meet specific needs such as those of policy-makers, planners and academic staff, particularly in developing countries. However, this opinion is not shared by the majority of the international community, for the following reasons:

(1) In particular, General Assembly resolutions 3507 (XXX) of 15 December 1975 and 31/183 of 21 December 1976, and ECOSOC resolution 1902 (LVII) of 1 August 1974.

(2) These references refer to the documents and publications on SPINES mentioned in Annex 3.

(i) the coverage defined above is the empirical result of many consultations and much research undertaken by Unesco for more than ten years in the field of science and technology policies; moreover, it meets the needs expressed by the principal users at the time of the survey conducted by Unesco in 1972 on needs and procedures for the establishment of SPINES;

(ii) in order to meet the specific needs of its users, the SPINES system will provide information of superior quality by means of a systematic selection of documents at the time of input;

(iii) the history of nations demonstrates the failure of all non-integrated policies; it is not possible to conceive of a policy acceptable to society as a whole which is based solely on economic considerations. All policies, thereby including science and technology policies, must rely on a global societal scheme which includes the philosophical, ethical, psychological, social, cultural and environmental dimenions as well as the economic dimension of the life of a society. In a world of increasing complexity, the problems, and especially those of developing countries, must be solved in an integrated manner. The SPINES system seeks to provide the information needed for an interdisciplinary, rational and global approach to the application of science and technology to development and to break down the obsolete barriers which still exist between decision-makers, human and social scientists, and natural scientists;

(iv) finally, the suppression of some areas would result in only a slight reduction in the operational cost of the system, but would bring about a more than negligible loss in the number of users.

1.4 Target users of the SPINES system

The target users of the SPINES system are the partners in, and the parties affected by, decision-making processes at all levels and in all areas of science and technology, and their application to socio-economic and cultural development. These users may be defined more precisely as follows:

(i) national development planning agencies, and in particular governmental science and technology policy-making and co-ordinating bodies, and other national bodies concerned with the application of science and technology to development;

(ii) special parliamentary groups concerned with questions of science and technology policy;

(iii) teaching and research units in the field of science and technology policies;

(iv) governing bodies of R&D institutes and of scientific and technological services;

(v) governing bodies of production enterprises which have a high coefficient of R&D or which practise transfers of technology;

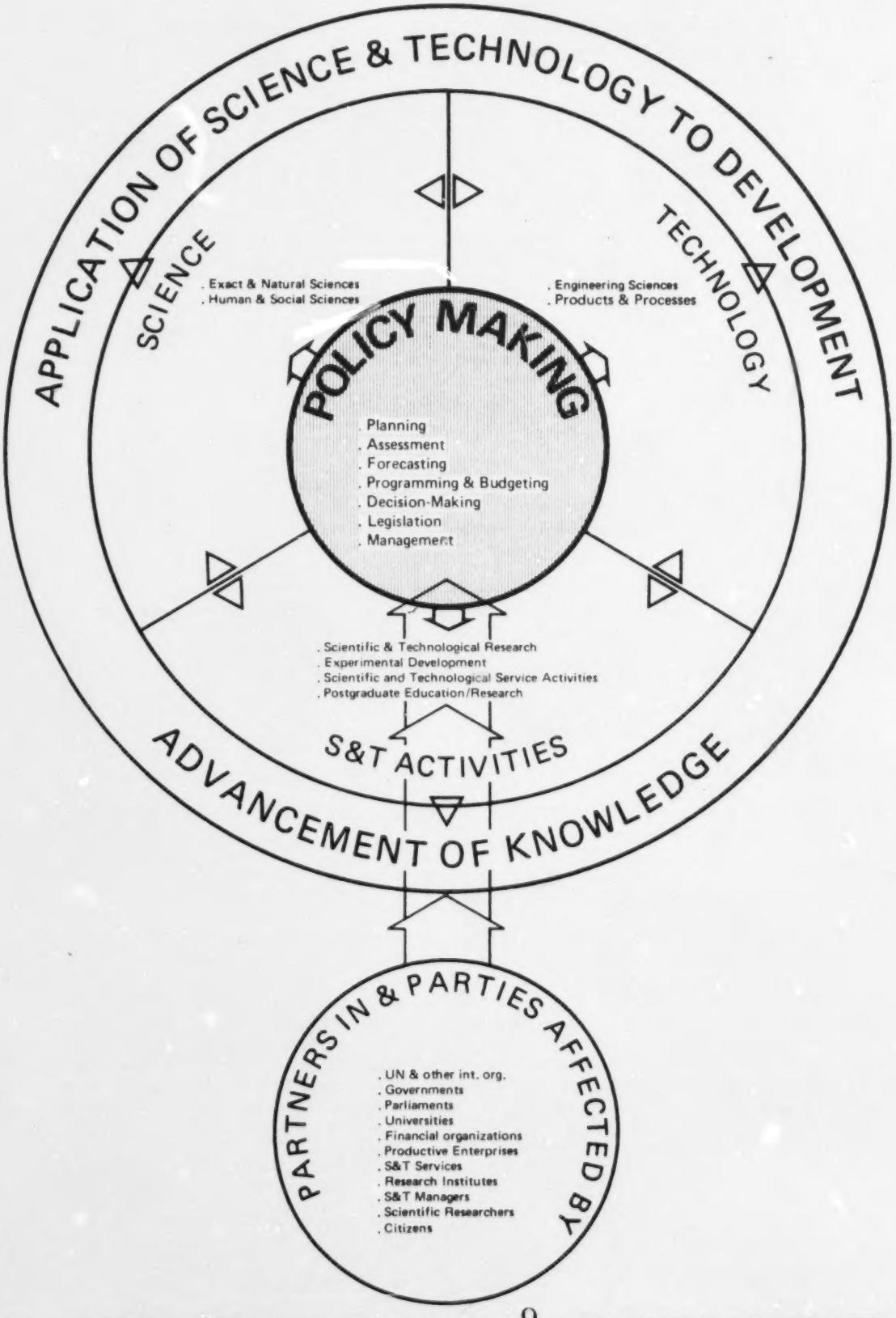
(vi) international (governmental and non-governmental) organizations concerned with science and technology and their application to development;

(vii) other, more marginal, users: university departments of political, economic and social sciences; national and international documentation and information services.

The systematic surveys on the needs of users[1] in the above-mentioned categories (i), (ii) and (iii), conducted in 1972 by the Unesco Secretariat, revealed a lively interest on their part in the establishment of a SPINES system. Specifically, of the 361 respondents (48% of the questionnaires sent out), 78% of the 185 science and technology policy-making bodies (84 of which belong to developing countries), 86% of the 164 teaching and research units in science and technology policy, and 33% of the special parliamentary groups concerned with science and technology replied that they need access to an international information service in the field of science and technology policy. That need has grown steadily since then.

(1) Document Unesco/NS/ROU/244, Paris, 1972.

PRODUCERS AND USERS OF THE INFORMATION COVERED BY THE SPINES SYSTEM



The objectives and principles set out in the foregoing paragraphs, together with the UNISIST recommendations and standards, constitute the conceptual framework within which the methods of developing, operating and financing the SPINES system must be studied. One practical procedure that might be adopted is described in the SPINES Feasibility Study undertaken during the preparatory phase of the project, the proposals of which will be modified in the course of the SPINES Pilot Programme (1977-1982) so that they will be more user-responsive and cost-effective.

2. PREPARATORY PHASE OF THE SPINES PROJECT 1970-1976

As far back as 1970, the General Conference of Unesco adopted a resolution to promote the exchange of information in the field of science and technology policies. This resolution was soon followed by the first preparatory steps undertaken by the Secretariat towards the progressive establishment of a world-wide information system in this field: the SPINES system. The main steps taken by Unesco between 1970 and 1976 preparatory to the establishment of the SPINES system were as follows.

2.1 The SPINES Feasibility Study (1 and 5)

The purpose of the Feasibility Study on the SPINES system is to define one of the possible managerial, technical, legal and financial modalities for the establishment of a SPINES system. The preparation of the study was entrusted in 1973 to an international team composed of the following consultants: Dr. H. Coblans (United Kingdom), Chairman of the Study Group and formerly a member of ASLIB (Association of Special Libraries and Information Bureaux); Mr. J. Ducrot (France), Manager, Data Processing and Information Service, Institut Textile de France; Mr. E. Houtart (Belgium), Director, Centre de recherche et documentation juridiques (CREDOC); and Mr. L. Rolling (Luxembourg), Chief, Information Management Division, European Communities.

2.1.1 Operational features of the SPINES system proposed in the Feasibility Study (8)

According to the plan outlined in the Feasibility Study, which follows the overall design of the INIS system developed by the International Atomic Energy Agency, SPINES would be an international, decentralized and computerized system for the storage and retrieval of bibliographical data accompanied by indexing terms and abstracts; at a later stage, input of factual data might be considered, such as data concerning ongoing R&D projects which are of interest to developing countries. The operational features of the SPINES system would be as follows:

(a) Infrastructures

The decentralized SPINES system would comprise:

(i) a Central Processing Group (CPG) which would be an autonomous body, preferably located elsewhere than at Unesco and established under agreement between Unesco and the host Member State or international organization;

(ii) several national/regional units serving as relays allowing for the participation of volunteer countries in the input of the SPINES system.

(b) Input

(i) National/regional units would be responsible for:

- the selection of the literature to be included, the criteria applied being geographical area (has the document been produced in the geographical zone for which the unit is responsible?), subject (does the document fall - wholly or partly - within the scope of SPINES?) (4) and quality (does the information contained in the document warrant a place in SPINES?);

- the acquisition of documents;

- the cataloguing, indexing and abstracting of national/regional literature on the basis of the SPINES Thesaurus and according to the standardized technical guidelines adopted for SPINES;

(ii) the Central Processing Group would be responsible for:

- the cataloguing, indexing and abstracting of literature from international organizations;

- the supervision, co-ordination and standardization of the work of the national/regional units;

(iii) Unesco would retain supervisory responsibility for the coverage of the literature to be processed and for the conceptual coverage of the SPINES Thesaurus; it would also ensure that the UNISIST guidelines and principles were followed.

(c) Processing

(i) National/regional units would be responsible for:

- the transfer of the standard coding sheets on to a machine-readable medium, if technically feasible;

- making suggestions for the updating of the Thesaurus;

(ii) the Central Processing Group would be responsible for:

- the transfer on to a machine-readable medium of:

  literature from international organizations;

  literature not transferred by national/regional units;

- the merging of magnetic tapes;

- the production of an abstracts bulletin (called "SPINIA");

- the maintenance of the Thesaurus.

(d) Output

It is expected that all Unesco Member States would immediately benefit from the system as soon as it became operational:

(i) national/regional units would:

- supply original documents (one copy or microfiche of each document on request and at cost price);

- provide, according to their wishes, any information services except those provided by the Central Processing Group;

(ii) the Central Processing Group would be responsible for:

- the dissemination of the SPINES merged magnetic tapes (one free copy per Member State);

- the dissemination of the SPINIA bulletin (one free copy per Member State);

- the supply of original documents from international organizations (one copy or microfiche of each document on request and at cost price).

(e) Financial aspects

(i) National/regional units would be financed by the participating countries. The Study made no concrete proposals concerning the internal organization and budgets of these units, which depend chiefly on the local conditions prevailing in the participating countries.

(ii) The Central Processing Group would be financed partly from Unesco's regular budget and partly from extra-budgetary sources. A full, detailed budget (staffing costs, offices and furniture, administrative costs, technical operating costs, computer time and printing costs) accompanies these proposals: it amounts to approximately $250,000 per annum, based on prices in January 1974. Staffing costs are those necessary for a minimum staff consisting of the following: 1 director, 3 documentalists, 1 analyst programmer, 1 administrative secretary, 2 typists and 1 operator/machinist.

(f) Legal aspects

Various possible legal forms for the Central Processing Group are described in some detail in the Feasibility Study, namely:

- an autonomous organization based on a multinational agreement;
- the management of the Central Processing Group by an existing non-governmental or intergovernmental organization whose statutes and bye-laws are not incompatible with the proposed SPINES system;
- an international non-governmental organization incorporated under the national law of a Unesco Member State;
- the creation of an entity by a Member State with the participation of Unesco;
- integration within the Unesco Secretariat.

This Study contains the texts of formal agreements which might be concluded between Unesco and Member States concerning the establishment of (i) national/regional units, and (ii) the Central Processing Group.

2.1.2 Reasons for certain proposals put forward in the Feasibility Study

(a) SPINES as a decentralized system

The Feasibility Study suggests decentralized input for the following reasons: (i) the indexing and collection of literature will be carried out with greater facility at the national and regional levels; (ii) the diversity of languages in which input documents appear makes decentralization a necessity; (iii) the creation of a nucleus of trained indexers in the developing countries is an important aspect of the programme, since these indexers will also be trained for and requested to help in the dissemination of the information stored in the system within their respective countries. It was for the same reasons that the experts suggested decentralization of input for use in other already operating international information systems such as the INIS system, developed by IAEA, and the AGRIS system, developed by FAO. As far as the advanced industrialized countries are concerned, the literature and data input services concerned with SPINES could easily be integrated into already existing structures and mechanisms that have been set up for handling scientific and technological information at the national level; this would substantially reduce the overall costs of the collection and indexing of the information specifically meant for inclusion in the SPINES system. Moreover, the idea should be encouraged of building up SPINES starting from the national level.

(b) SPINES as a computerized system

For various reasons, the Feasibility Study proposes the use of computers to handle the SPINES system. Magnetic tape input would satisfy two aims simultaneously. First, by means of existing software, such as that of the INIS system of IAEA, it is possible to publish materials - such as the SPINIA bulletin - quickly, once the documents have been sorted out by the computer. Second, after several years, computerization would make it possible to produce (and if necessary to publish) cumulative indexes by subject. The computerization of the system would also make it possible to conduct high-speed literature searches, either retrospective, or by individual profile. Most experts agree that computerization of information pays when the annual number of input documents exceeds 10,000. The Unesco surveys on the amount of literature(1) have arrived at a figure of some 33,000 documents per year. This is a minimum basic figure, since the surveys made no claim to be exhaustive and since the present trends of the literature in the field reveal a marked expansion. It is worth while drawing attention to the fact that experience gained

(1) Documents Unesco/NS/ROU/281, 282, 283, Paris, 1973.

with existing computerized systems has shown that the performance of such systems becomes especially attractive from the economic point of view once the accumulated stock of indexed documents reaches approximately 100,000, a situation which is foreseen with regard to SPINES after three years of full operation.

(c) SPINES as a bibliographical system

When the users (groups (i) and (iii) - see paragraph 1.2.3) were questioned, in the course of the survey conducted in 1972, on the needs and procedures for the establishment of a SPINES system, they replied that priority should be given as follows to the information services to be supplied by SPINES (in decreasing order of priority):

1. periodic cumulative lists of references accompanied by abstracts and classified by subject (like the SPINIA bulletin);

2. services for the selective dissemination of information in accordance with the interest profiles of users, and rapid awareness services;

3. question and answer services and retrospective search services based on key-words.

Nevertheless, the range of clientele groups to be served requires the establishment of both bibliographic and numerical data bases within SPINES, with due consideration of specific user information/data requirements and local customs concerning information retrieval. This approach falls easily within the scope of the potential output of the SPINES system mentioned in the Feasibility Study. It would imply an appropriate modification of the worksheets for cataloguing, indexing and abstracting with a view to adding specific codes indicating the presence of numerical data in the document ("flag") and their level of reliability ("tag"). It is also recognized that any information system usually begins as a bibliographical system and that as it develops it gradually provides other types of services: question-answer services, selective dissemination of information, retrospective searches and factual data on scientific and technological potential or on ongoing R&D projects which are of relevance to developing countries.

In short, the proposals formulated in this study are based on:

(i) the systematic surveys conducted by the Unesco Secretariat in 1972 and 1973, on the one hand on the needs and procedures for the establishment of a SPINES system, and on the other on the volume of literature produced every year which is of relevance to the system;

(ii) the experience acquired by the operational international information systems that have been developed within the United Nations system, such as INIS, developed by the International Atomic Energy Agency (IAEA) or AGRIS, developed by FAO, or at the national level, such as TITUS, developed by the Institut Textile de France;

(iii) the recommendations and standards of Unesco's UNISIST programme.

2.2 Provisional world list of periodicals dealing with science and technology policies (2)

As part of its survey work on the volume of literature produced in the field of science and technology policy, the Secretariat of Unesco compiled a list of 1,200 periodicals, published in 77 of its Member States, which deal regularly with science and technology policies; that list was published in the form of a provisional directory in 1974. It constitutes a minimum, but not a sufficient, basis for the selection of periodicals to be scanned systematically by the participating countries. Only after a few years' use will it be possible to identify the nucleus of periodicals which produce the great majority of relevant articles in the field. It is reasonable to suppose that this nucleus contains some 200 periodicals, 150 of which should be analysed from cover to cover.

2.3 SPINES Thesaurus (3)

The SPINES Thesaurus, whose source version in English was compiled between 1972 and 1975 by the Secretariat of Unesco with the co-operation of one consultant and many voluntary contributors, according to UNISIST guidelines, is a major achievement in the field of information relating to science and technology policy-making, management, transfer and assessment and their application to development. It is a controlled and structured vocabulary which contains approximately 10,500 terms, of which about two-thirds are authorized descriptors, linked by a network of more than 74,000 semantic relations. In order to assist the user in selecting appropriate descriptors, looking at the subject from several angles, this vocabulary is presented in two complementary forms:

(i) an alphabetical structured list(1) in which all the terms (descriptors and non-descriptors) are shown alphabetically, accompanied by all their relations;

(ii) 54 terminological graphic displays (or charts) sharing the whole conceptual coverage of the SPINES Thesaurus between them and showing in a two-dimensional plane all the terms of the Thesaurus in the context of their semantic relationships.

It is also a dynamic vocabulary which will be periodically updated by:

(i) introduction of new terms;

(ii) deletion of obsolete terms;

(iii) correction of word forms;

(iv) correction of erroneous term definitions;

(v) correction of erroneous term relationships.

This updating will be based on periodic verification by the Central Processing Group of the SPINES system (or a similar body) and on proposals from indexers and other users which have been accepted by this group. However, no decision entailing major amendments, in particular the deletion of terms judged to be marginal, will be made before the accumulated stock of indexed documents reaches a significant number.

2.3.1 Conceptual coverage of the SPINES Thesaurus(2)

The SPINES Thesaurus covers the concepts related principally to:

(i) the process of science and technology policy-making and R&D management

- foundations of science (or science of science)
- scientific and technological resources
- R&D planning, programming and budgeting at the national level
- management of R&D institutes, laboratories and units
- technological forecasting, assessment and transfer
- legislation in science and technology
- international co-operation in science and technology

(ii) scientific and technological activities

- scientific and technological research
- experimental development
- operations prior to large-scale production
- scientific and technological services
- post-graduate education

(iii) the scientific disciplines and major technologies which are the subject of policies and research

- natural sciences (such as biology, chemistry, mathematics and statistics, physics, environmental sciences, etc.)
- social and human sciences (such as demography, economics and management, education, history, philosophy, psychology, juridical sciences, politics, sociology, etc.)
- applied sciences and technologies (such as agriculture, information sciences, medical sciences, engineering sciences - construction technology, electronics, mechanics,

(1) Compiled with the aid of INIS software placed at the disposal of the Unesco Secretariat by IAEA.

(2) Not to be confused with the field covered by the SPINES system.

metallurgy, power technology, space technology, telecommunications, transport - the major industrial products and processes, etc.)

(iv) socio-economic and cultural development

economic growth

advancement of knowledge

application of science and technology to development

technological change

social progress

cultural life

(v) partners in and parties affected by processes (i), (ii) and (iv)

United Nations and other international organizations

governments

parliaments

universities

financial organizations

productive enterprises with a high R&D coefficient

R&D institutes and scientific and technological services

scientific researchers

citizens

(vi) geographical entities (countries and seas)

2.3.2 Objectives of the SPINES Thesaurus

By reason of its very broad coverage and its structural neutrality, the SPINES Thesaurus will provide a means, at both national and international levels, of indexing:

(i) the literature dealing with all aspects of science and technology policy (cf. para. 1.3)

(ii) ongoing R&D projects: in contrast to traditional classifications, structured by definition according to a single theme or criterion, such as discipline or economic sector, the SPINES Thesaurus provides a means of describing R&D projects qualitatively according to multiple criteria such as the theme, the economic sector concerned, the scientific disciplines involved, the type of equipment used, the scientific and technological objectives (results of R&D), or the socio-economic objectives (socio-economic application of those results). Furthermore, the SPINES Thesaurus allows a flexible approach, geared to the needs of science and technology policy-makers, because of its features and the possibilities it offers:

its a posteriori construction reflecting the present state of the fields covered;

its network of multiple, neutral relations, defined at the semantic level;

its evolutive nature, guaranteed by regular updating;

the multiple points of rapid access to the relevant concept (the result of its wealth of controlled and structured vocabulary and of its supplementary alphabetical and graphic representations);

the computerization of its updating, of the correction of certain indexing errors, and of information retrieval;

the ability to characterize an R&D project by a theoretically unlimited number of descriptors linked by logical operators;

this is not true of traditional classifications, which are often devised a priori, in a systematic way, and which, owing to their inflexibility and their exclusively hierarchical structure, often reflecting a specific conception of knowledge, society or development, are ill-suited to rapid changes in knowledge and in society, to the growing volume of

multidisciplinary research, to the multiplicity of complementary and interdependent R&D objectives and, finally, to use in an international context;

(iii) profiles of experts: the same arguments apply as for R&D projects;

(iv) literature and projects which have a bearing on development in general of which science and technology are the main driving force;

(v) books received by general or multidisciplinary libraries (e.g. national libraries).

It also contributes to the definition and standardization of the terminology used in science and technology policy and in R&D management, and to improved communication within and across the frontiers of the various scientific and technological disciplines involved in the overall development of countries.

2.4 Consultations and meeting of governmental experts held in 1975 and the nineteenth session of the General Conference of Unesco

At its eighteenth session, the General Conference of Unesco invited the Director-General "to organize a meeting of governmental experts with a view to preparing a report and a proposal for a resolution, to be examined by the General Conference at its nineteenth session, on the establishment of a science and technology policies information exchange system (SPINES), in accordance with the recommendations of the UNISIST programme" (para. (a) of resolution 2.123).

The meeting of experts was preceded by three consultations organized in Spring 1975 by the Secretariat of Unesco, with: (i) the National Commissions for Unesco of all Member States; (ii) the members of the UNISIST Advisory Committee; and (iii) the International Council for Science Policy Studies (of the International Union for the History and Philosophy of Science, a body affiliated to the International Council of Scientific Unions (ICSU)). These consultations were focused on the technicalities of the SPINES system, and their purpose was to elicit suggestions concerning modifications that might be desirable in the design of the SPINES system as proposed in the Feasibility Study.

2.4.1 Consultation of the National Commissions for Unesco (6)

Of the 57 replies received from the National Commissions by 14 October 1975, 40 were favourable to SPINES and 10 unfavourable; five countries were not in a position to reply, and two not yet in a position to participate in the SPINES system if the latter were to be launched immediately. A number of countries firmly supported SPINES and indicated their willingness to participate in the system, namely: Belgium (which expressed an interest in hosting the SPINES Central Processing Group, under certain conditions and provided that the system received the approval of the General Conference), Brazil, Bulgaria (which offered in addition to serve as a SPINES regional unit), Czechsovlovakia, Egypt, Hungary, India (which also showed an interest in serving as a SPINES regional unit), Jordan, Mexico, Sri Lanka, Sudan, Thailand, Union of Soviet Socialist Republics. The importance of SPINES for all countries, and more particularly for the developing ones, was stressed. Ten countries expressed disagreement or reservations about the SPINES system: Austria, Canada, Denmark, Finland, France, Norway, Sweden, Switzerland, United Kingdom, United States of America. The arguments put forward by one or more of these countries mainly concerned the lack of need or demand for SPINES, the absence of an appropriate national information infrastructure, the unnecessary complexity of SPINES, the probability of a negative cost/benefit ratio; and the financial arrangements for the system.

2.4.2 Consultation of the UNISIST Advisory Committee(1) (6)

"The experts of the UNISIST Advisory Committee generally expressed their satisfaction with the technical design of the SPINES system, as proposed in the Feasibility Study" (cf. para. 2.1.1). "They however underlined the fact that a certain number of technical questions would find a relevant solution as the system is operationally developed". In the course of the consultation, the following major suggestions were noted:

(i) selection of literature:

"The importance (quantitatively and substantially) of the non-conventional literature has been particularly stressed";

(1) The passages quoted are taken from the report on the consultation, Unesco document SC-75/CONF.613/3.

(ii) Thesaurus:

"The experts have expressed the desire that the English source version of the SPINES Thesaurus be rapidly adapted to other languages, this being of great importance in an international multilingual information system";

"To this end, it was suggested that working groups from the same language countries be created";

(iii) supply of original documents:

"The experts expressed the desire that the Central Processing Group be provided with a microfiche copy of each document entered in the system";

(iv) financing:

"The experts suggested that the possibility of a joint United Nations financing of the SPINES system be considered";

(v) location of structures:

"The experts expressed their preference for the installation of the Central Processing Group within an existing international organization to ensure the maximum efficiency of the SPINES system";

(vi) staffing of the Central Processing Group:

"The experts estimated that the size of the staff for the Central Processing Group as foreseen in the Feasibility Study was a strict minimum".

2.4.3 Consultation of the International Council for Science Policy Studies (6)

At its first session (Berlin, German Democratic Republic, 14 April 1975) the International Council for Science Policy Studies adopted the following recommendation on SPINES(1): "The International Council for Science Policy Studies strongly reiterates its belief that there is a need for a well organized information system for science policy studies. It therefore welcomes the steps taken by Unesco in this direction. The Council is awaiting with great interest the testing of the SPINES system".

2.4.4 Meeting of governmental experts, October 1975 (7)

The Director-General invited the governments represented on the UNISIST Steering Committee (Argentina, Belgium, Ethiopia, France, Federal Republic of Germany, Ghana, India, Japan, Peru, Sweden, Tanzania, Tunisia, USSR, United Kingdom, United States of America, Yugoslavia) to appoint experts in order to:

(i) examine, firstly, whether there was a need for a SPINES system, and, that need having been recognized;

(ii) express opinions on the form which such a system might take;

(iii) propose a timetable for the gradual establishment and testing of the system; and

(iv) put forward suggestions to ensure its compatibility with the guidelines and standards of the UNISIST programme.

Most of the 16 experts appointed also represented their countries on the UNISIST Steering Committee. Six countries (Brazil, Egypt, German Democratic Republic, Poland, Senegal and Spain) and ten international organizations (three United Nations organizations, four intergovernmental organizations and three non-governmental organizations) had sent observers. In addition, five consultants with high-level responsibilities in the development of information systems or information infrastructures took part in the meeting.

During the meeting, a division of opinions, similar to the one reflected in the consultation of the National Commissions, appeared between experts from different regions or countries.

(1) Extract from Unesco document SC-74/CONF.613/3.

"It emerged that a possible way of proceeding might lie in blending the two different perspectives which materialized during the general discussion. The wishes of those wanting early action might be met by their starting with a prototype programme along the lines suggested by those wanting a more simplified approach within the conceptual framework of UNISIST and with advice from the UNISIST Steering Committee on matters falling within its competence.

Objectives of the prototype programme would be:

(a) to elaborate this new and simplified approach in the light of comments made by experts at this meeting;

(b) to gain operating experience to be fed back to improve the design of the system and the effectiveness of operations; and

(c) to assess more accurately the volume, character and costs of operations."
(Extracts from the report on the meeting: Unesco document SC-75/CONF. 613/4)

A formal and unanimous consensus emerged at the end of the meeting to recommend to the Director-General (i) the launching of a SPINES prototype programme (on the basis of these objectives) during the period 1977-1982 and, irrespective of the future of SPINES, (ii) the maintenance of the SPINES Thesaurus and the co-ordination of its multilingual development according to the UNISIST guidelines.

2.4.5 Nineteenth session of the General Conference of Unesco

Following the recommendations formulated by the meeting of governmental experts in October 1975, the General Conference of Unesco, at its nineteenth session (Nairobi, November 1976), adopted the following resolution by 45 votes in favour, 1 against and 8 abstentions:

> "2.123: The General Conference,
>
> Authorizes the Director-General to initiate a pilot programme for the international exchange of information on the application of science and technology to development in the Member States, with particular reference to literature and basic data which have a direct bearing on policy-making, management, transfer and assessment in the field of science and technology."

In the course of the preceding discussion, most countries declared themselves in favour of the SPINES system and of most of its characteristics as proposed in the Feasibility Study, but a few countries expressed reservations, especially with regard to the quality of the literature likely to enter the system and the probable cost-benefit ratio of the system proposed by Unesco. Furthermore, there was a division of opinion on the procedures for financing the pilot programme, some countries urging that it should be financed from voluntary contributions and others that its budget should be included in the regular budget of Unesco. Finally, a number of countries expressed the view that SPINES should in due course be made a part of the General Information Programme of Unesco, its connection with the UNISIST programme being made clear.

2.5 The SPINES workshops organized in Hungary and India in 1976

The Library of the Academy of Sciences of Hungary and the Council of Scientific and Industrial Research (CSIR) of India agreed to undertake, on a voluntary basis, a number of experimental activities before the launching of the SPINES pilot programme. At their request, a SPINES workshop was held in India (CSIR, New Delhi, 18-28 October 1976) and in Hungary (Library of the Academy of Sciences, Budapest, 23 November to 1 December 1976); the three major objectives of the workshops were as follows:

(a) to introduce the SPINES Thesaurus to Hungarian and Indian specialists and to enable it to be used under the SPINES system itself and possibly in the context of other specific needs of these two countries;

(b) to facilitate exchanges of views based on the professional experience of the participants and on the practical exercises undertaken during the workshop, in order to make improvements to the basic principles at present proposed, concerning the selection and indexing of documents of relevance to SPINES;

(c) to examine, as a follow-up to these two workshops, the possibilities of co-operation by Hungary and India in the SPINES pilot programme, i.e. with regard to:

(i) continuation in 1977 of the testing of the proposals in the SPINES Feasibility Study and the INIS guidelines concerning input operations;

(ii) participation in 1978 in SPINES working groups set up under the pilot programme with a view to finding, on the basis of these preliminary tests, a more suitable and simpler approach than that at present proposed in the Feasibility Study;

(iii) testing, from the end of 1978 onwards, of the proposals formulated by the SPINES working groups;

(iv) the establishment in Hungary and in India of a SPINES pilot unit.

These workshops, whose participants were for the most part decision-makers and specialists in the field of science policy and information, made it possible to put into practice a number of the principles proposed in the Feasibility Study and to make improvements to them in accordance with the wishes expressed by the General Conference of Unesco at its nineteenth session. In particular, these improvements affect the procedures for the qualitative selection and analysis of documents that are of relevance to the system: development and testing of (i) subject categories(5), (ii) quality indicators, enabling documents of little value to be eliminated either at the input stage or at the retrieval stage, (iii) contents indicators, enabling the needs of the various types of users to be met more satisfactorily at the time of retrieval, and (iv) a flowchart showing the logical sequence of the analysis operations (selection, bibliographical description and indexing).

During these workshops, the Library of the Academy of Sciences, of Hungary, and the Council of Scientific and Industrial Research, of India, both proposed to continue such experimental activities under the pilot programme on a voluntary basis. Furthermore, following this workshop, the Council of Scientific and Industrial Research amended its monthly bibliography and abstract bulletin "Current Literature on Science of Science" by classifying the entries in the bulletin according to the SPINES subject categories (cf. Annex 1) and by labelling them with descriptors from the SPINES Thesaurus.

3. SPINES PILOT PROGRAMME 1977-1982

3.1 Objectives of the SPINES pilot programme

In accordance with the recommendations of the meeting of governmental experts in October 1975 and with resolution 2.123 adopted by the General Conference of Unesco at its nineteenth session, and in order to reconcile the conflicting opinions expressed in the course of the discussion which preceded the adoption of that resolution, the SPINES pilot programme will be launched, with the voluntary participation of Member States and of competent national and international organizations which are interested, on the basis of the following objectives:

(i) to seek out user-responsive and cost-effective approaches to SPINES;

(ii) to gain operating experience with a view to improving the design of the proposed system;

(iii) to assess as accurately as possible the effectiveness and the costs, both for Unesco and for participating Member States, of operating the SPINES system.

3.2 Activities of the SPINES pilot programme

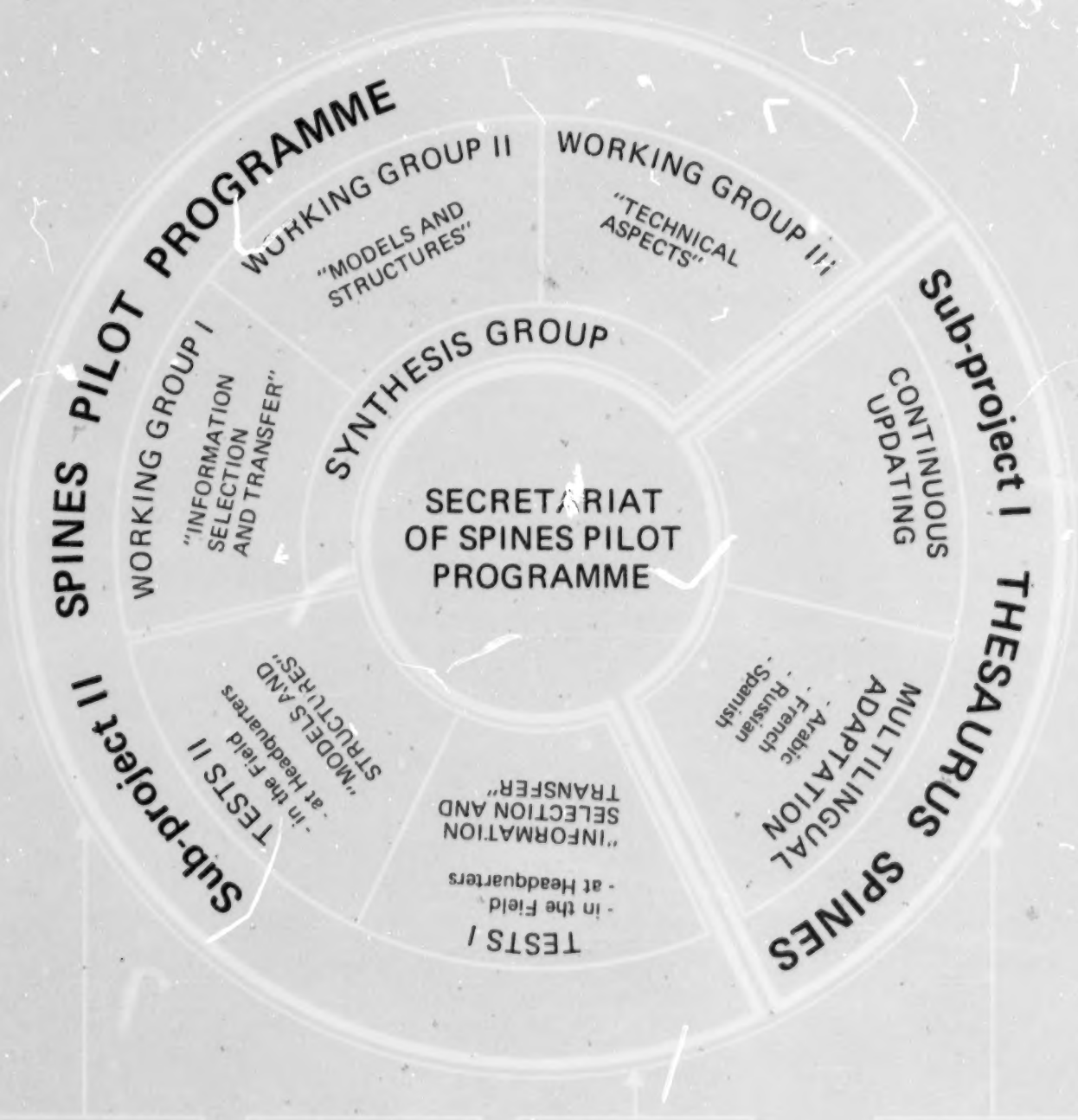
The activities of the SPINES pilot programme will focus on:(1)

(i) development and testing of user-responsive and cost-effective approaches to SPINES;

(ii) the continuous updating and co-ordinated multilingual adaptation of the SPINES Thesaurus.

(1) The diagram on the following page and the table in Annex 2 summarize the activities planned between 1977 and 1982.

PILOT PROGRAMME
FOR THE INTERNATIONAL EXCHANGE OF INFORMATION
ON THE APPLICATION OF SCIENCE AND TECHNOLOGY TO DEVELOPMENT
SPINES



PARTICIPATION OF MEMBER STATES	PARTICIPATION OF NATIONAL ORGANIZATIONS	PARTICIPATION OF INTERNATIONAL ORGANIZATIONS	UNESCO SPONSORING ORGANIZATION
In activities and/or in cash	in activities	in activities	

Before describing the activities of the SPINES pilot programme in detail, it should be emphasized that these activities will depend to a great extent on the voluntary and effective participation of the Member States concerned. Thus the pace of execution will depend on the budget and on the staff placed at the programme's disposal, particularly through the voluntary contributions received (as provided for in paragraph 2054 of document 19 C/5 Approved) and their success will depend on the services which Member States are also prepared to place at the programme's disposal so as to adapt SPINES to their specific needs.

3.2.1 Development of user-responsive and cost-effective approaches to SPINES

(a) WHY?

An answer must be given to the criticism by certain Member States of some of the proposals contained in the Feasibility Study, and to the desire expressed by those countries for the development of new SPINES approaches which are more user-responsive and cost-effective.

(b) HOW?

Several small working groups composed of decision-makers and specialists (individuals and institutions) from developed and developing countries, in the field of science and technology policies and information, will be organized. On the basis of the objectives and principles which, together with the recommendations and norms of UNISIST, constitute the conceptual framework of the SPINES system (cf. Part 1), these SPINES working groups will:

(i) identify and make a qualitative assessment of the specific needs for bibliographical and factual data of the various types of target users of SPINES (cf. Section 1.2.3);

(ii) in terms of this evaluation, define the form to be given to the input documents and data (bibliographical and factual data) to avoid overwhelming these users with material which is inappropriate (in quantity and in quality), and formulate operational methods and procedures for selection, analysis, condensing and repackaging of such information;

(iii) taking into account existing resources and constraints (technical, financial, political and legal) at the national and international levels, formulate operational methods and procedures for the transfer of the processed information, without discontinuity or waste of time, from the source to the user's table;

(iv) elaborate simple and efficient models adapted to the needs of users and to local conditions prevailing in participating countries, for the design of input, processing and output structures;

(v) assess the effectiveness and cost of operating SPINES, both to Unesco and to participating Member States.

If original solutions to the problems raised by each of the points mentioned above - and in particular by (i), (ii) and (iii) - are sought, it is likely that the number of actual users will be approximately equal to the identified number of target users; this is far from true in the case of existing information systems and services.

It is proposed that three working groups and a synthesis group should be organized:

Working Group I "Information selection and transfer", to find procedures of selection, analysis, condensation, repackaging, transfer and dissemination of information of relevance to SPINES, adapted to the specific needs of the Member States and the various types of users, and showing a satisfactory cost-benefit ratio;

Working Group II "Models and structures", to elaborate and assess various models for information input, processing and output structures, adapted to the needs of users and to local conditions in participating countries, and showing a good cost-benefit ratio;

Working Group III "Technical aspects", to study, on the basis of the proposals of Working Group I, the technical methods and procedures, guidelines and (if necessary) software involved in the operations of cataloguing, analysis and processing of information of relevance to SPINES at the national and international levels;

Synthesis Group composed of one member from each working group and one of the consultants responsible for the Feasibility Study, whose task will be to co-ordinate the proposals put forward by Working Groups I, II and III and to work out a global, coherent design for the SPINES system, including the technical, financial and organizational arrangements for its implementation.

(c) WHEN?

1977 - organization of Working Groups I and II

planning of work
consultation on the matter with the competent organs of UNISIST
selection of participants in Working Groups I and II
preparation of basic documentary material

1978 - organization of Working Group III
- meeting of Working Groups I and II
- first meeting of the Synthesis Group for the preparation of a provisional synthesis report

1979- - meeting of Working Group III
1982 - second meeting of the Synthesis Group for the preparation of a final synthesis report
- drafting, finalization and dissemination of technical guidelines for input, processing and output operations; preparation of training activities and materials;
- regular assessment of the SPINES pilot programme and adaptation of the SPINES system accordingly.

3.2.2 Testing of user-responsive and cost-effective approaches to SPINES

(a) WHY?

The aim is to comply with the wishes expressed by Member States, the majority of which are in favour of rapid action, taking the view that "the system as proposed should be given a chance to find its feet by a gradual process of implementation with particular reference to the needs of developing countries"; this would enable the SPINES system to "learn by experience", "operating experience to be fed back to improve the design of the system and the effectiveness of operations"(1).

(b) HOW?

Two complementary series of experimental activities will be launched simultaneously in the field by the volunteer countries participating in the SPINES pilot programme either in kind or in services, and at Unesco's Headquarters by the small unit in charge of the management of this programme:

(i) tests of information selection and transfer procedures;

(ii) tests of input, processing and output models and structures.

Experimental Activities I will be concerned with tests of the selection, analysis, condensation, repackaging, storage and retrieval of information of interest to the users of the SPINES system, and with the provision of pilot information services for those users in order to determine their relative value for them:

- to that end, tests undertaken in the field by Hungary and India in 1976, especially during the two SPINES workshops organized in those two countries, will be continued. The purpose is to test (i) some of the proposals made in the Feasibility Study concerning the selection and analysis of information, (ii) the guidelines of the INIS system developed by IAEA for input operations, (iii) the rules for the use of the SPINES Thesaurus, (iv) the documentary categories (cf. Annex 1) which constitute the areas to be covered by SPINES, and (v) the quality and content indicators worked out in the course of the two workshops; the results of these preliminary tests will serve as a working basis for the working groups mentioned above, and especially for Working Group I;

(1) The passages quoted are taken from the report of the meeting of governmental experts held in October 1975; Unesco document SC-75/CONF.613/4.

- the proposals put forward by Working Group I will be implemented on a pilot scale, in the field, by Hungary, India and other volunteer countries;

- the management unit of the SPINES pilot programme will undertake experimental activities which will focus more particularly on the storage and retrieval of information, in close liaison with the tests being conducted in the field.

Steps will be taken to adapt the INIS software of IAEA and to work out other programmes necessary for the experimental activities. Technical assistance may be given to Member States participating in the field tests, at their request.

Experimental Activities II will concern field testing by the participant countries of the models, of national/regional SPINES units developed by Working Group II, and testing by the management unit of the SPINES pilot programme of models for the Central Processing Group:

- the countries participating in this experimental activity will verify the models of national/regional units which have been developed and supplement them with factual data collected in the field. To that end, they will conduct the baseline studies necessary for establishment of national/regional SPINES units in their countries or regions, as follows: identification of the principal producers of literature of relevance to SPINES in the country and the region, quantitative and qualitative assessment of their output, study of acquisition procedures (conventional and unconventional literature, conditions of transfer of copyright of abstracts), and assessment of costs in the light of local conditions (the existence or otherwise of a reception structure, of qualified staff and of the necessary equipment, etc.) prevailing in the country or the region. A small number of national/regional pilot units will then be set up, with the technical assistance of experts who have participated in Working Group II, and training seminars will be organized for the staff of those units;

- in accordance with the approach chosen for the selection and transfer of information (cf. Working Group I and Experimental Activities I), and on the basis of the experience acquired by the unit responsible for the management of the SPINES pilot programme in the field of information storage and retrieval, a model of a Central Processing Group will be set up as a pilot project.

(c) WHEN?

1977-1978 Continuation of the field tests begun by Hungary and India in 1976

1978 onwards Experimental activities undertaken by the participating countries:

- verification in the field, by means of sample surveys of national/regional users, of the accuracy of the needs identified;
- field tests of selection and analysis of the requisite information;

Experimental Activities I undertaken by the management unit:

- tests of information storage and retrieval;
- adaptation of the INIS software of IAEA and development of the other necessary programmes;

Experimental Activities II undertaken by the participating countries:

- conducting of baseline studies in the field which are necessary to the setting up of national/regional pilot units;

1979 onwards Experimental Activities I undertaken by the management unit in collaboration with the participating countries:

- provision of pilot information services and determination of their relative value for target users;

Experimental Activities II undertaken by the participating countries:

- establishment of a limited number of national/regional pilot units;
- periodic assessment of the costs of the structures necessary for SPINES at the national and regional levels

Experimental Activities II undertaken by the management unit:

- organization of training seminars for the staff of the national/regional pilot units, on the basis of the guidelines laid down by Working Group III;
- establishment of a pilot Central Processing Group;
- periodic assessment of the costs of the structures necessary for SPINES at the international level.

3.2.3 Activities relating to the SPINES Thesaurus

3.2.3.1 Continuous computerized updating of the SPINES Thesaurus (3)

(a) WHY?

The aim is to bring the SPINES Thesaurus regularly up to date in order to make improvements suggested by its use, and to adapt its conceptual and structural content to the changes that constantly take place in knowledge and society.

(b) HOW?

The management unit will assemble and analyse, on a permanent basis, (i) errors detected and improvements proposed in the course of use of the SPINES Thesaurus, and (ii) amendments needed to facilitate its co-ordinated multilingual adaptation. The amendments decided upon will be transferred to graphic displays and coded on a machine-readable medium in order to produce by computer a revised alphabetical structured list of the SPINES Thesaurus. To that end, the INIS software of IAEA for the updating of thesauri will be geared, to the needs of the SPINES Thesaurus.

(c) WHEN?

1977 onwards.

3.2.3.2 Co-ordinated multilingual adaptation of the SPINES Thesaurus (3)

(a) WHY?

The SPINES Thesaurus is available at present in an English version, but it must be multilingual, so that information in science and technology may be exchanged, at the international, regional and national levels, for the purpose of policy-making, management and development.

(b) HOW?

What is needed is not a straightforward translation in the usual sense of the term. The production of a multilingual thesaurus poses linguistic and conceptual problems of considerable complexity. The task is in fact one of adaptation, which must be carried out from within the cultural universe concerned, both linguistically and from the point of view of subject concepts. To this end, joint linguistic teams will be set up for several countries using the same language. However, the indispensable compatibility of the various linguistic versions can be obtained only if these adaptations are carried out in a co-ordinated manner - and preferably simultaneously for Arabic, French, Spanish and Russian, initially - under the supervision of UNISIST and in close co-operation with the management unit of the SPINES pilot programme; this is the only way to ensure that standard solutions, common to all the linguistic teams, are adopted for each problem encountered. There are two possible procedures for achieving such co-ordination:

(i) decentralized procedure: the linguistic teams (3 specialists x 18 months per team) work in their respective country/body, with regular meetings (1 specialist x 10 meetings x 4 days per team) at Unesco Headquarters and periodic visits (3 visits x 5 days for each team) of a Unesco co-ordinator (1 specialist from the SPINES pilot programme management unit x 24 months);

(ii) centralized procedure: 2 specialists per language are seconded for 4 months by the countries/bodies concerned forming an international working group together with the Unesco co-ordinator (1 specialist x 6 months).

The procedure selected (centralization or decentralization) will have a major impact both (i) on costs (salaries, travel and hotel expenses) and the length of the operation, and (ii) on the quality of the co-ordination and, hence, on the final product. The budget of the SPINES pilot

programme for 1977-1978 (cf. para. 3.4.2) has been calculated on the basis of centralized co-ordination, the costs of the linguistic teams being borne by the countries/bodies concerned.

On the basis of the UNISIST recommendations, the management unit will prepare standardized guidelines geared to the characteristics of the SPINES Thesaurus, and will provide the necessary software for the multilingual development of the various linguistic versions.

For this work it has been thought preferable, where possible, to approach intergovernmental organizations whose member countries use the same language. The organizations contacted are as follows: the Institute of Studies and Research for Arabization, in Rabat, for the Arabic adaptation; the Ibero-American Bureau of Education for the Spanish adaptation; the Conseil International de la Langue Française for the French adaptation; and the Institute of Scientific and Technological Information of USSR (VINITI) for the Russian adaptation.

(c) WHEN?

1977 - Preparation, in collaboration with UNISIST, of draft standardized guidelines for the co-ordinated multilingual adaptation of the SPINES Thesaurus;

- Working meeting at Unesco Headquarters with the organizations contacted in order to discuss co-ordination procedures, the organization of linguistic teams and the planning of their work for the co-ordinated adaptation of the Thesaurus into Arabic, French, Russian and Spanish;

- Setting up of linguistic teams by the supervisors of the various linguistic versions;

- Investigation to find the necessary software for the development of each linguistic version from the English source version;

1978 - Initial work of adaptation into Arabic, French, Russian and Spanish;

- Development of the necessary software (if it does not already exist).

3.2.3.3 Experimental use of the SPINES Thesaurus for purposes other than science and technology policy documents

The management unit of the SPINES pilot programme will seek to promote the experimental use of the SPINES Thesaurus, at the international or the national level, for the following purposes (cf. para. 2.3.2):

(i) description of ongoing R&D projects in the context of inventories of national scientific and technological potential;

(ii) in connection with this use, a posteriori development of more neutral classifications of scientific disciplines or of development objectives;

(iii) description of the projects undertaken by the bodies and specialized agencies of the United Nations system (e.g. in the context of the CORE project undertaken by IOB (cf. Section 3.3);

(iv) description of profiles of experts in the context of the data banks which are being built up within the international organizations;

(v) indexing of literature and projects which have a bearing on economic, social and cultural development.

3.3 Co-operation of SPINES with international information systems in the field of science and technology

(a) WHY?

It is important to ensure the compatibility and complementarity of SPINES with international information systems which already exist or which are planned for the future in the field of science and technology, and to take advantage of their experience in order to improve the design of the SPINES system.

(b) HOW?

The management unit of the SPINES pilot programme will participate in work undertaken by the bodies and Specialized Agencies of the United Nations system with a view to co-ordinating and harmonizing the systems for the exchange of information on the application of science and technology to development, and it will establish close contacts with the main international information systems already in existence or at the planning stage. To be more precise, the management unit will:

(i) maintain close and permanent contact with the UNISIST programme, the organs of which will be consulted on issues falling within their sphere of competence, and with the Inter-Organization Board for Information Systems and Related Activities (IOB);

(ii) participate in work undertaken by the Inter-Agency Task Force on Information Exchange and the Transfer of Technology (IATFIS) with a view to establishing an international exchange network of technological information, in order to study the place of SPINES within that network with regard to information on technology policies, assessment and transfer;

(iii) establish a close bond with the existing systems, INIS, developed by IAEA, and AGRIS, developed by FAO, in order to benefit from their practical experience;

(iv) keep itself informed of the work of the Preparatory Committee of the United Nations Conference on Science and Technology for Development, with regard to scientific and technological information for development.

4. HOW TO TAKE PART IN THE SPINES PILOT PROGRAMME

In accordance with resolution 2.123 adopted by the General Conference of Unesco at its nineteenth session, the Director-General is authorized to launch a SPINES pilot programme with the voluntary participation of Member States and of competent national and international organizations, with a view to developing and testing SPINES approaches which will be user-responsive and cost-effective. To that end, the Director-General will, in the course of this year, send out circular letters and negotiate with Member States and with competent national and international organizations to enlist their participation, in cash, in kind and in services, in the SPINES pilot programme; a special account will be opened at Unesco to receive the funds placed at the disposal of the SPINES pilot programme.

Member States of Unesco may participate in the SPINES pilot programme, in cash, by financing its budget, and/or in kind and services, by providing experts to take part in the SPINES working groups, by undertaking certain experimental activities in the field, or by taking responsibility for the linguistic teams in charge of the multilingual adaptation of the SPINES Thesaurus. It is particularly desirable that Member States which have criticized the design of the SPINES system as proposed in the Feasibility Study should participate - even without financing the SPINES pilot programme - in the various SPINES working groups responsible for improving that design.

National bodies may participate in the activities of the SPINES pilot programme by informing their countries of their interest in the programme and, where appropriate, of their wish, in view of their experience in the field of information, to take part in the SPINES working groups or in the experimental activities undertaken in their countries.

International organizations may place the experience which they have acquired in the development or management of international information systems at the disposal of the SPINES pilot programme by participating voluntarily in the SPINES working groups or, alternatively, by authorizing the use of the software in their possession for input, processing and output operations.

Finally, you can participate personally in the SPINES pilot programme: if you are an expert in the exchange of scientific and technological information, by proposing solutions which will improve the design of the SPINES system, and, if you are one of the target users of SPINES, by stating exactly what information you need and what you expect from a system such as SPINES.

MAILING ADDRESS

For offers of participation in the SPINES pilot programme:

Director-General of Unesco
Unesco
7 place de Fontenoy
75700 Paris
France

For requests for information about the SPINES pilot programme:

SPINES PILOT PROGRAMME
c/o Director
Division of Science and Technology Policies
Unesco
(same address)

For publication orders, especially orders for the SPINES Thesaurus, which is available for sale only:

Office of the Unesco Press
Sales Service
Unesco
(same address)

ANNEX 1

FIELDS COVERED BY THE SPINES SYSTEM[1]

- subject categories -

A00 FOUNDATIONS OF SCIENCE AND TECHNOLOGY

- A01 Theory and systematization of science and technology
- A02 Philosophy and ethics of science and technology
- A03 History of science and technology since the nineteenth century
- A04 Sociology of science and technology
- A05 Economics of science and technology
- A06 Politics of science and technology
- A07 Creativity and psycho-sociology of scientific researchers

B00 SCIENCE AND TECHNOLOGY RESOURCES

- B01 Human resources for science and technology
- B02 Financial resources for science and technology
- B03 Scientific and technological information
- B04 Scientific and technological facilities and equipment
- B05 Institutional resources for science and technology
- B06 Other resources and constraints influencing the trends of S&T policy

C00 PRACTICE OF SCIENCE AND TECHNOLOGY POLICY-MAKING

- C01 Elaboration, implementation and monitoring of national science and technology policies (i.e. plans, programmes and budgets)
- C02 Science and technology forecasting, technology assessment
- C03 Transfer, diffusion and implantation of technologies
- C04 Organization and management of scientific and technological activities at the performer's level
- C05 Legislation in science and technology
- C06 International co-operation in the field of science and technology

D00 CONTENT OF PLANS, PROGRAMMES AND PROJECTS RELATED TO SCIENTIFIC AND TECHNOLOGICAL ACTIVITIES

- D01 Fundamental research and sciences
- D02 Agricultural R&D
- D03 Industrial R&D (including construction, mines, transport and communications)
- D04 Medical R&D
- D05 Environmental R&D (including geology, hydrology, oceanography and meteorology)
- D06 Space R&D
- D07 Energy R&D
- D08 Defence R&D
- D09 Socio-economic and cultural research
- D10 Multisectoral R&D and other scientific and technological activities

(1) The content of each section is defined in Draft SPINES Subject Categories; Unesco document SPINES/4/Prov.

ANNEX 2

SUMMARY TABLE OF THE ACTIVITIES PLANNED FOR THE SPINES PILOT PROGRAMME

Planned activities \ years	1977	1978	1979	1980	1981	1982
1. Activities related to the SPINES Thesaurus						
1.1 Computerized updating on a continuous basis	•	•	•	•	•	•
1.2 Multilingual adaptation (Arabic, French, Spanish and Russian)	•					
1.2.1 Organization of Arabic, French, Spanish and Russian linguistic teams		•	•			
1.2.2 Coordination of team work				•		
1.2.3 Printing of the multilingual SPINES Thesaurus						
2. Development of user-responsive and cost-effective approaches to SPINES						
2.1 Working group 1 "Information selection and transfer"						
2.1.1 Organization	•					
2.1.2 Meetings		•				
2.2 Working Group II "Models and structures"						
2.2.1 Organization	•					
2.2.2 Meetings		•				
2.3 Working Group III "Technical aspects"						
2.3.1 Organization		•				
2.3.2 Meetings			•			
2.3.3 Drafting of guidelines for information processing			•	•		
2.4 Synthesis group "Global design"						
2.4.1 Organization		•				
2.4.2 Meetings		•	•		•	
2.4.3 Synthesis report				•		•
2.5 Evaluation of SPINES and consequential adaptation		•		•		•
3. Experimentation of user-responsive and cost-effective approaches to SPINES						
3.1 Experimental activities I "Tests on information selection and transfer procedures						
3.1.1 Field tests by participating countries:						
• continuation of the activities started by Hungary and India in 1976	•	•				
• tests by participating countries of the proposals made by Working Group I		•	•	•	•	•
3.1.2 Tests at Unesco Headquarters:						
• adaptation and elaboration of the necessary software	(•)	•	•	•		
• storage and retrieval tests	(•)	•	•	•	•	•
• provision of pilot information services				•	•	•
3.1.3 Provision of technical assistance	(•)	•	•	•	•	•
3.2 Experimental activities II "Tests of models and structures of information input, processing and output"						
3.2.1 Field tests by participating countries:						
• basic studies necessary for the establishment of national/regional pilot units		•	•			
• tests of the Working Group II proposals by establishing a limited number of national/regional pilot units			•	•	•	•
• evaluation of the costs of SPINES structures at the national/regional level				•		•
3.2.2 Tests at Unesco Headquarters:						
• establishment on a trial basis of a central processing structure			•	•	•	•
• evaluation of the costs of SPINES structures at the international level				•		•
3.2.3 Provision of technical assistance and organization of training seminars for the staff of the pilot units.		•	•	•	•	•

ANNEX 3

MAIN SPINES DOCUMENTS AND PUBLICATIONS

SPINES Reference Series

This series contains the rules, standards, formats, codes, etc., on which the proposed SPINES system is based.

1. Science and Technology Policies Information Exchange System. A Feasibility Study. Unesco, Paris, 1974. No. 33 (1) in the Unesco series "Science Policy Studies and Documents" (published in English and available for sale only).

2. Provisional World List of Periodicals dealing with Science and Technology Policies. Unesco, Paris, 1974. No. 33 (2) in the Unesco series "Science Policy Studies and Documents" (published in English and available for sale only).

3. SPINES Thesaurus. A Controlled and Structured Vocabulary of Science and Technology for Policy-Making, Management and Development. (Vol. I - Rules, Conventions and Directions for Use; Vol. II, Parts 1 and 2 - Alphabetical Structured List; Vol. III - 34 Terminological Graphic Displays.) No. 39 in the Unesco series "Science Policy Studies and Documents" (published in English only and available for sale).

4. Draft SPINES Subject Categories. Unesco, Paris, September 1976. Unesco document SPINES/4/Prov. (internal document with limited distribution).

Assessment and reports on activities

5. Results of the Feasibility Study on the Establishment of a Science and Technology Policies Information Exchange System ("SPINES") - Unesco document 18 C/75, Paris, 1974.

6. Results of the consultations on the SPINES system - Unesco document SC-75/CONF.613/3, Paris, 3 September 1975.

7. Meeting of Experts appointed by Governments on the Establishment of a Science and Technology Policies Information Exchange System (SPINES); final report, Unesco document SC-75/CONF.613/4, Paris, 18 October 1975.

8. An international System for the Exchange of Information on Science and Technology for Policy-Making, Management and Development ("SPINES"). Report of the Director-General to the nineteenth session of the General Conference of Unesco, Unesco document 19 C/33, Paris, 1976.

Background documents

9. SPINES pilot programme for the International Exchange of Information on the Application of Science and Technology to Development. Unesco document NS/ROU/387, Paris, May 1977 (English/French/Spanish).